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Hydrozoa from the coastal waters of Maharashtra

Part I. Hydromedusae¹

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(With three plates)

Nineteen species of hydromedusae were collected from inshore waters of Maharashtra, but mainly from Bombay. Earlier authors have recorded only six species of these hydromedusae from Bombay.

One medusa, *Aglauropsis vannuccii*, was found to be new to science. Four species—*Aequorea australis*, *Eutonina indicans*, *Phialidium malayense* and *Podocoryne ocellata*, are recorded for the first time from India.

Eight other medusae are recorded for the first time from Maharashtra.

Marine hydroids and hydromedusae, though of common occurrence in the coastal waters of Maharashtra, have not been given the attention they deserve. They are considered to be of relatively little importance, since they do not comprise an item of human diet or otherwise contribute to economic value. Previous studies on hydromedusae from Indian coasts have mainly been restricted to the south. Thus,

M. A. S. Menon (1945), Nair (1951), George (1953), and Vannucci and Santhakumari (1969) have studied these animals from Kerala. Taxonomic accounts of these forms from Madras are by K. S. Menon (1931) and M. G. K. Menon (1932). The only other work on the east coast is that of Ganapati & Nagabhushanam (1958) from Visakhapatnam. The collection of hydromedusae in the Indian Museum (from the Nicobar Islands, Visakhapatnam, Orissa, Mergui Archipelago, and Burma) was studied by Kramp (1958).

Browne (1916) pioneered the study of hydromedusae from western Indian coast, with his description of two forms, namely, *Amphogona*

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apsteini and *Solmundella bitentaculata* together with the siphonophore (*Dichyopsis chamissonis* and the scyphomedusa *Cassiopea andromeda* var. *maldivensis*) from Okhamandal, Gujarat State. The only other study, albeit sparse, of medusae from western Indian coasts is by Lele & Gae (1935) who recorded six species from Bombay harbour. Bal & Pradhan (1952) could not add any more species to Lele and Gae's list.

During taxonomic study of the hydromedusae collected from the coastal waters of Maharashtra, 19 species, belonging to 16 genera and five Orders, were identified. One of these turned out to be new to science, and has been described in detail earlier (Thomas & Chhapgar 1975). Four species are new records for India, while eight species have been collected for the first time from Maharashtra. All the 19 species recorded from Maharashtra were found at Bombay.

The hydromedusae, obtained by horizontal hauls with a plankton net, were preserved by adding 12.5 ml formaldehyde (40%) to about 100 ml of sea water containing the animals. Places other than Bombay could not be visited frequently, but collections in the Bombay harbour were made once every fortnight. It was found that the hydromedusae were apparently absent in the harbour during monsoon (June-September). The largest numbers of medusae were collected during the pre-monsoon period, but in post-monsoon period their number was considerably reduced. This is because the coastal waters, especially in semi-enclosed places like the Bombay harbour, are subjected to heavy monsoon rains which results in dilution from a normal salinity of 36‰ to as low as 13‰. Bhattacharya (1971), in laboratory studies on the salinity tolerance of hydromedusae from Bombay, concluded that these animals are intolerant of such dilutions. Even in a 40% dilution of sea water, no species of hydromedusae could survive for 48 hours.

Order ANTHOMEDUSAE

Family TUBULARIIDAE

Genus *Euphysa* Forbes

Euphysa aurata Forbes

Plate I (a)

Euphysa aurata Forbes, *Monogr. Brit. naked-eyed medusae*: 71 (1848); Kramp, *J. Mar. biol. Ass. U.K.* 40: 36 (1961); Vannucci & Santhakumari, *J. Mar. biol. Ass. India* 11: 40 (1969).

Steenstrupia aurata Mayer, *Medusae of the world*: 35 (1910).

Corymorpha aurata Ostenfeld, *Publ. circ. cons. Explor. Mer.* 70: 42 (1916).

Steenstrupia virgulata Bigelow, *Pap. Boston Soc. nat. Hist.* 7: 5 (1914).

Umbrella bell-shaped with rounded apex, without apical canal. Tentacle moniliform with nematocyst rings and devoid of a large terminal knob. Three non-tentacular, per-radial marginal bulbs present. Stomach large, tubular, extending up to the velar opening, with a circular, simple mouth. Lips and oral tentacles absent. Four narrow radial canals join the ring canal at the margin. Gonads simple and encircle almost the whole of the stomach, leaving only the upper end of the stomach and mouth free. Excretory papillae ocelli and sense organs absent.

The species can be distinguished by the presence of one tentacle and three non-tentacular per-radial marginal bulbs, rounded apex, and absence of apical canal. The tentacle is moniliform and devoid of a large terminal knob. Nematocyst rings are present on the tentacle.

28 specimens, including 11 young, were collected. The adults measure up to 4 mm in height and a little less in width.

This species was first recorded in the Indian Ocean by Vannucci & Santhakumari (1969) from Kerala. This is the first record from the coasts of Maharashtra.

It has been recorded from the coastal waters of Chile, China, Philippines, and the east coast of Malacca in the Pacific Ocean. It also occurs along both the coasts of the Atlantic Ocean as well as in the Mediterranean and Adriatic Seas.

Genus *Euphysora* Maas

Euphysora bigelowi Maas

Plate I (b)

Euphysora bigelowi Maas, *Siboga Exped. Monogr.* 10 : 71 (1905); Nair, *Bull. Cent. Res. Inst., Univ. of Travancore* 2 : 50 (1951); Ganapati & Nagabhushanam, *Mem. Oceanogr. Andhra Univ.* 2 : 92 (1958); Kramp, *Rec. Ind. Mus.* 53 : 340 (1958); Kramp, *J. Mar. biol. Ass. U.K.* 40 : 39 (1961).

Steenstrupia bigelowi Mayer, *Medusae of the world* : 39 (1910); Lele & Gae, *J. Univ. Bombay* 3 : 91 (1935); Bal & Pradhan, *ibid.* 20 : 76 (1952).

This species can be distinguished by the presence of single long tentacle with adaxial nematocyst knobs, and three short tentacles without nematocyst knobs. Apex pointed but without apical canal. The gonad encircles the peduncle.

It is a strictly neritic, epipelagic medusa. 33 specimens, of which 8 are young, are in the present collection. A typical medusa measures 13 mm in height and 5 mm in width.

This species has been previously recorded from Bombay waters by Lele & Gae (1935) and by Bal & Pradhan (1952) as *Steenstrupia bigelowi*. It is quite common in the Indo-Malayan region, coasts of Africa, southern Japan, China, and off north-eastern Australia.

Family PANDEIDAE

Genus *Merga* Hartlaub

Merga tergestina (Neppi & Stiasny)

Plate I (c)

Tiara tergestina Neppi & Stiasny, *Zool. Anz. Leipzig* 39 : 556 (1912).

Merga tergestina Kramp, *J. Mar. biol. Ass. U.K.* 40 : 107 (1961); Vannucci & Santhakumari, *J. Mar. biol. Ass. India* 11 : 40 (1969).

non Kramp, *Atlantide Rep.* 3 : 250 (1955).

Top of the umbrella pointed and without an apical canal. Manubrium about two-thirds as high as the bell cavity, with faintly crenulated lips, without nematocyst knobs. The 4 to 8 tentacles have large conical basal bulbs, each of them having ocelli, but there are a few very small rudimentary bulbs without ocelli. Gonads adradial, mesenteries short.

Three specimens were collected, about 7 mm high and 4 mm wide.

This is the first record of this species from Maharashtra. Vannucci & Santhakumari (1969) have previously recorded it from Cochin waters. It also occurs in the Gulf of Guinea, at Trieste and Naples and in Adriatic Sea.

Family HYDRACTINIDAE

Genus *Podocoryne* Sars

Podocoryne ocellata (Agassiz & Mayer)

Plate I (e)

Lymnorea ocellata Agassiz & Mayer, *Mem. Mus. comp. zool. Harv.* 26 : 144 (1902); Mayer, *Medusae of the world* : 153 (1910).

Podocoryne ocellata Kramp, *J. Mar. biol. Ass. U.K.* 40 : 70 (1961).

Medusa with deep, bell-shaped umbrella with flat top and thin walls. Manubrium half as long as the bell cavity, with four branched oral tentacles. Four, narrow, straight, unbranched radial canals with four interradial gonads.

There are 30-40 short, solid, stiff marginal tentacles with quite prominent basal bulbs, each with a prominent adaxial ocellus.

Marginal and lateral cirri and sense organs absent.

This species can be distinguished by the manubrium being half as long as the bell cavity, the oral arms divided four times, presence of four interradial gonads, and about 40 short, stiff tentacles, each with a prominent adaxial ocellus.

Nine specimens were collected, measuring 2-3 mm in height as well as width.

This is the first record of this species from Indian seas. It has earlier been recorded from Paumotus, in the South Pacific Ocean.

Order LEPTOMEDUSAE

Family AEQUOREIDAE

Genus *Aequorea* Peron & Lesueur

Aequorea conica Browne

Plate I (d)

Aequorea conica Browne, *Rep. Pearl Oyst. Fish. Mannar* 27: 145 (1905); Nair, *Bull. Cent. Res. Inst. Univ. Travancore* 2: 68 (1951); Ganapati & Nagabhushanam, *Mem. Oceanogr. Andhra Univ.* 2: 92 (1958); Kramp, *Rec. Ind. Mus.* 53: 360 (1958); Kramp, *J. Mar. biol. Ass. U.K.* 40: 206 (1961).

Gelatinous substance in the high, conical umbrella very thick in the central part, the ridge being thin with a narrow velum. Subumbrellar side convex. Gastric peduncle absent. Stomach broad, flat—half as wide as the umbrella diameter, with 16 crenulated, long, slender lips. These latter have a furrow continuing along the inside of the stomach to the 16 simple (undivided) narrow radial canals. The 16 laterally compressed, smooth gonads are situated on the proximal half of the radial canals.

From 26 to 30 hollow, small tentacles, with conical basal bulbs and excretory pores. Statocysts twice as many as tentacles, each with two concretions between the marginal bulbs and the tentacles. Cordyli, marginal or lateral cirri, ocelli and excretory papillae absent.

This species can be distinguished by its high-conical umbrella, with gonads at the proximal half of the 16 radial canals, a mouth with long and slender lips, and about 30 tentacles (twice the number of radial canals).

29 specimens were collected. Average height is 12 mm and width 9 mm.

This is the first record of the species from Maharashtra. The species is quite common in the coastal waters of India. Nair (1951)

recorded it from Trivandrum, Ganapati & Nagabhushanam (1958) from Visakhapatnam and Kramp (1958) from the Mergui Archipelago. Outside India, it is common in the Malayan Archipelago, Mozambique Channel, China and in north Australian coastal waters.

Aequorea australis Uchida

Plate I (g)

Aequorea australis Uchida, *J. Fac. Sci. Hokkaido Univ.* 9: 307 (1947); Kramp, *J. Mar. biol. Ass. U.K.* 40: 205 (1961).

Aequorea forskalea Vanhoeffe, *Zoologica Stuttgart* 67: 24 (1913).

Distinguished from *A. conica* by its low umbrella, up to 35 mm in diameter, concave sub-umbrella. Lips present but very small and highly frilled. Tentacles as many as radial canals. Basal bulbs with excretory papillae. Gonads more than half as long as the radial canals and situated nearer the margin than the stomach.

11 specimens are in the present collection, with the umbrella measuring 10-20 mm in diameter.

This is the first record of this species from the coasts of India. It occurs in the coastal waters of the Indo-west Pacific region, from East Africa to Tahiti, northwards to China and southwards to north-eastern Australia.

Family EIRENIDAE

Genus *Eirene* Eschscholtz

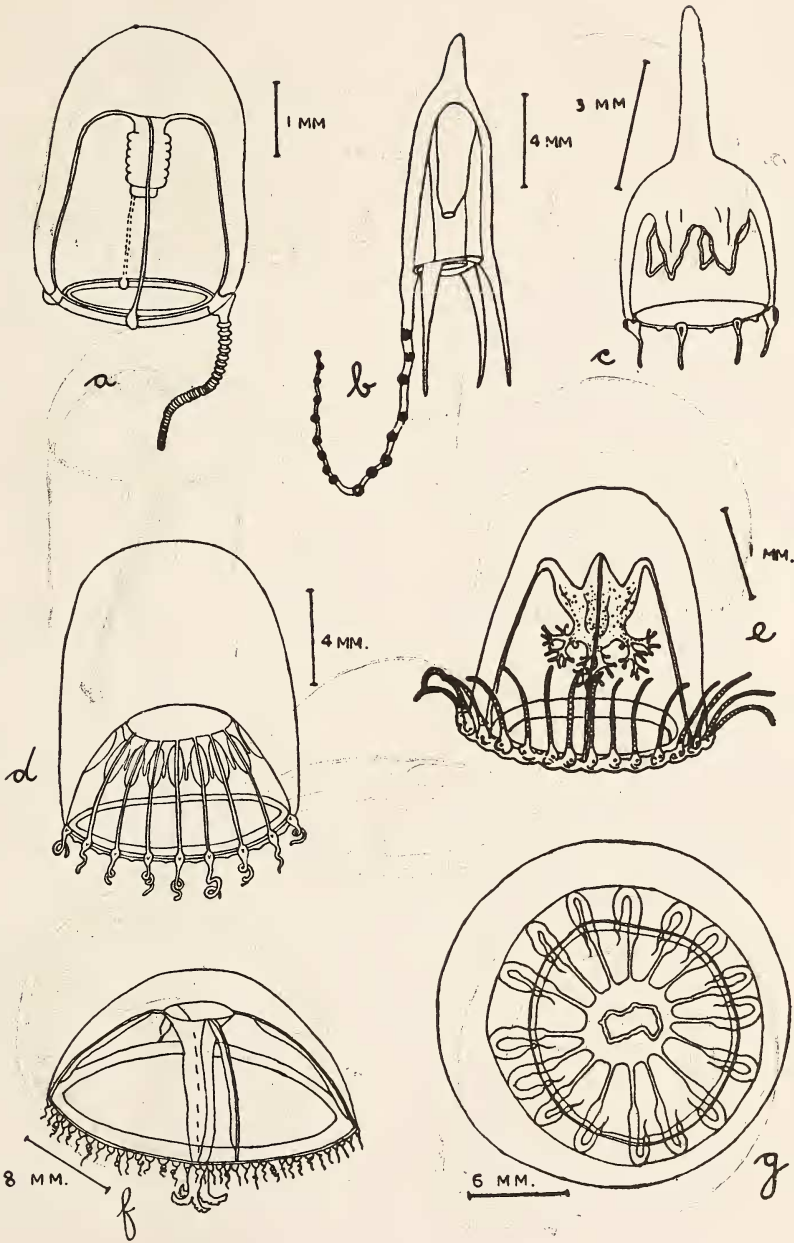
Eirene ceylonensis (Browne)

Plate I (f)

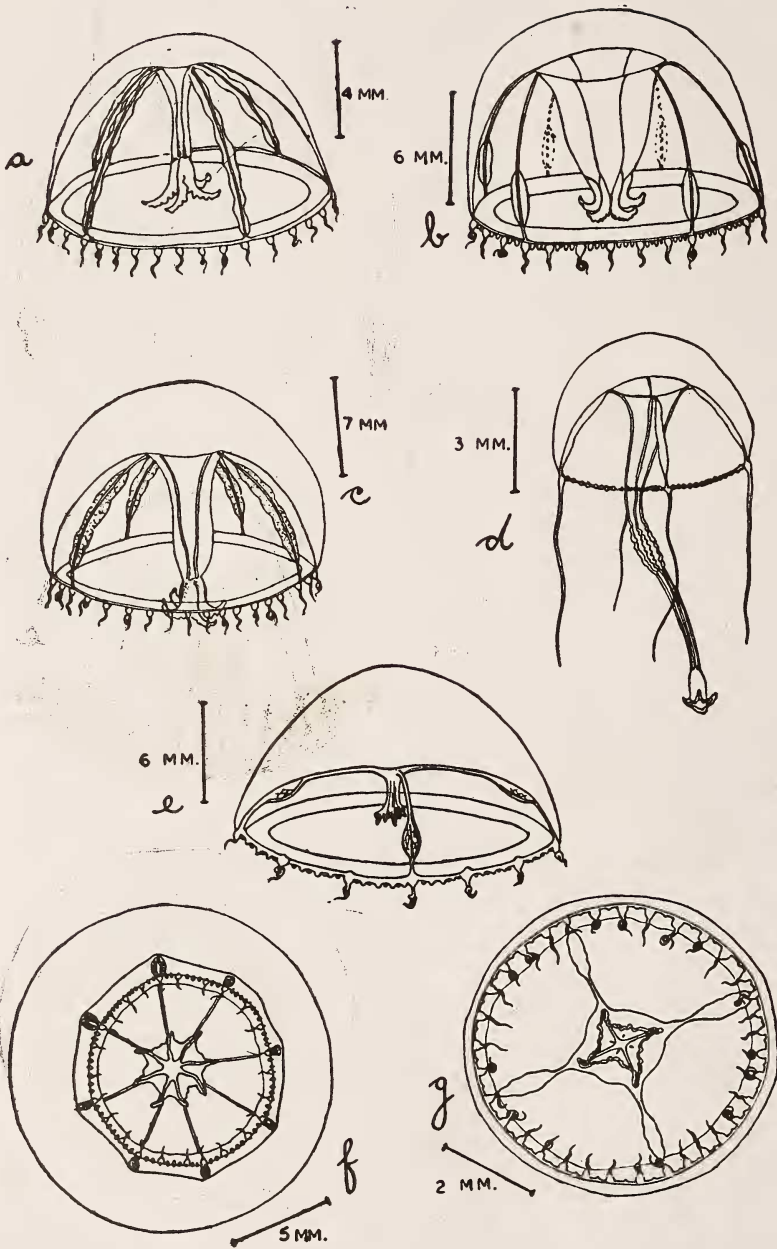
Eirene ceylonensis Browne, *Rep. Pearl Oyst. Fish. Gulf of Mannar* 27: 140 (1905).

Eirene ceylonensis Bigelow, *Mem. Mus. Comp. Zool. Harvard* 37: 160 (1909); Nair, *Bull. Cent. Res. Inst., Univ. Travancore* 2: 64 (1951); Kramp, *Rec. Ind. Mus.* 53: 352 (1958); Ganapati & Nagabhushanam, *Mem. Oceanogr. Andhra Univ.* 2: 92 (1958); Kramp, *J. Mar. biol. Ass. U.K.* 40: 187 (1961).

Phortis ceylonensis Lele & Gae, *J. Univ. Bombay* 3: 92 (1935); Bal & Pradhan, *ibid.* 20: 76 (1952).



Medusae of (a) *Euphysa aurata*, (b) *Euphysora bigelowi*, (c) *Merga tergestina*, (d) *Aequorea conica*, (e) *Podocoryne ocellata*, (f) *Eirene ceylonensis*, (g) *Aequorea australis*.



Medusae of (a) *Eirene menoni*, (b) *Eirene hexanemalis*, (c) *Eutonina indicans*, (d) *Eutima orientalis*, (e) *Phialucium carolinae*, (f) *Octophialucium indicum*, (g) *Phialidium malayense*.

Umbrella flat, with a thin wall. Four straight, narrow, unbranched radial canals. The four, very much folded, gonads are restricted to the sub-umbrellar portion of the radial canals. Over 100 short, slender, hollow, tapering marginal tentacles present.

The medusa is 15 to 25 mm wide.

The species, already recorded from Indian waters including Bombay, occurs in the coastal waters of the Indo-west Pacific, from East Africa to New Zealand and China.

Eirene menoni Kramp

Plate II (a)

Eirene menoni Kramp, *Sci. Rep. Great Barrier Reef Exped.* 6 : 286 (1953); Kramp, *Rec. Ind. Mus.* 53 : 353 (1958); Kramp, *J. Mar. biol. Ass. U.K.* 40 : 189 (1961).

Irene ceylonensis Annandale, *J. Asiat. Soc. Bengal* 3 : 79 (1907).

Eirene ceylonensis Nair, *Bull. Cent. Res. Inst., Univ. Travancore* 2 : 64 (1951).

Phortis sp. Menon, *Rec. Ind. Mus.* 33 : 503 (1931); Menon, *Bull. Madras Govt. Mus.* 1 : 18 (1932).

Umbrella evenly rounded. Four linear gonads, highly variable in length, and restricted to the umbrellar portion of the radial canal. There are 46 hollow marginal tentacles. Between each pair of tentacles are two rudimentary bulbs. Tentacles are all of nearly the same length but distance between them variable.

The umbrella of a typical specimen in the present collection is 12 mm wide and 5 mm high.

Annandale (1907) and Nair (1951) had recorded this species under the trivial name *ceylonensis* from Bengal and Trivandrum respectively. K. S. Menon (1931) and M. G. K. Menon (1932) had recorded it as *Phortis* sp.

This is the first record of this species from Maharashtra. It occurs in the Indo-west Pacific region, from East Africa to Polynesia.

Eirene hexanemalis (Goette)

Plate II (b)

Irenopsis hexanemalis Goette, *S. B. Preuss. Akad. wiss.* 7 : 832 (1886).

Irene hexanemalis Menon, *Bull. Madras Govt. Mus.* 3 : 19 (1932).

Eirene hexanemalis Kramp, *Vidensk. Medd. dansk. naturh. foren. Kbh.* 99 : 248 (1936); Nair, *Bull. Cent. Res. Inst., Univ. Travancore* 2 : 63 (1951); Ganapati & Nagabhushanam, *Mem. Oceanogr. Andhra Univ.* 2 : 92 (1958); Kramp, *Rec. Ind. Mus.* 53 : 354 (1958); Kramp, *J. Mar. biol. Ass. U.K.* 40 : 188 (1961).

Radial canals six. Stomach small and mounted on a wide peduncle. Mouth with six long, thin lips, with folded margins. From 30 to 50 tentacles present with a large basal bulb. Between each pair of tentacles three rudimentary bulbs and four marginal vesicles are present. There is an excretory pore at the base of each tentacle bulb and rudimentary bulb.

The gonads are confined to the distal portions of the radial canals, and are less than half as long as the radial canals.

10 specimens are in the present collection, measuring from 10-15 mm in diameter and slightly less in height.

This is the first record of this species from Maharashtra. It occurs in the coastal waters of the Indo-west Pacific region, from South-East Africa to Australia and Melanesia, and off southern China and Japan.

Family EUTIMIDAE

Genus *Eutonina* Hartlaub

Eutonina indicans (Romanes)

Plate II (c)

Tiaropsis indicans Romanes, *J. Linn. Soc. (Zool.)* 12 : 525 (1876).

Eutimalphes indicans Haeckel, *Erster. Theil. einer Monogr. der medusen* : 195 (1879).

Eutimium socialis Mayer, *Medusae of the world* : 306 (1910).

Eutonina socialis Hartlaub, *Wiss. Meeres. Abt. Helgoland* : 506 (1897).

Eutonina indicans Bigelow, *Proc. U.S. Nat. Mus.* 44 : 34 (1913); Kramp, *J. Mar. biol. Ass. U.K.* 40 : 200 (1961).

Bell walls thick at the middle and thin at the margin. Stomach short, with the conical peduncle extending up to the level of the velar opening. Mouth with four folded, broad lips. There are eight marginal vesicles, with 12 concretions.

The four linear gonads, sinuous along nearly the whole length of the subumbrellar portion of the four radial canals, extend from the base of the peduncle almost to the ring canal. There are about 100 short tentacles, with conical bases, without ocelli and excretory pores. Cirri and marginal warts absent.

Only two specimens represent the present collection. The larger one is 22 mm in diameter, with slightly more height.

This is the first record of this species from Indian waters. It is common in the Atlantic Ocean and also occurs off Japan and in the North Pacific.

Genus *Eutima* McCrady

Eutima orientalis (Browne)

Plate II (d)

Octorchis orientalis Browne, *Rep. Pearl Oyst. Fish. Gulf of Mannar* 27 : 139 (1905).

Octorchis gegenbauri Russel, *Medusae of the British Isles* : 367 (1953).

Eutima mira Vanhoffen, *Zoologica Stuttgart* 67 : 23 (1913); Menon, *Bull. Madras Govt. Mus.* 1 : 18 (1932); Nair, *Bull. Cent. Res. Inst., Univ. Travancore* 2 : 63 (1951); Ganapati & Nagabhushanam, *Mem. Oceanogr. Andhra Univ.* 2 : 92 (1958).

Eutima orientalis Mayer, *Medusae of the world* 1 : 299 (1910); Menon, *Rec. Ind. Mus.* 33 : 503 (1931); Kramp, *ibid.* 53 : 357 (1958); Kramp, *J. Mar. biol. Ass. U.K.* 40 : 198 (1961).

An easily identifiable species because of its characteristic hemispheric shape and eight gonads, four on the subumbrella and four on the peduncle. It has a very long, narrow, pris-

matic peduncle with a broad, dome-like base, extending far beyond the umbrellar margin.

The gonads, borne on the four radial canals, extend from the base of the peduncle almost to the ring canal and are much folded. Four perradial tentacles with lateral cirri and 60-80 marginal warts with lateral cirri. Eight closed marginal vesicles present. Excretory pores and cordyli absent.

Four specimens were obtained, measuring 5-6 mm in diameter and slightly more in height.

This is the first record of this species from Maharashtra. It has been recorded from the coasts of India, Ceylon, Nicobar Islands, Vietnam, China, Amboina, New Zealand, Philippines and Madagascar.

Family PHIALUCHIDAE

Genus *Phialucium* Maas

Phialucium carolinae (Mayer)

Plate II (e)

Oceania carolinae Mayer, *Bull. Mus. Comp. Zool. Harv.* 37 : 7 (1900).

Phialucium carolinae Nair, *Bull. Cent. Res. Inst., Univ. Travancore* 2 : 62 (1951); Kramp, *Rec. Ind. Mus.* 53 : 346 (1958); Kramp, *J. Mar. biol. Ass. U.K.* 40 : 185 (1961).

Phialucium virens Lele & Gae, *J. Univ. Bombay* 3 : 94 (1935); Bal & Pradhan, *ibid.* 20 : 76 (1952).

Octocanna polynema Kramp, *Atlantide Rep.* 3 : 260 (1955).

Pseudoclytia longleyi Burkenroad, *Biol. Bull. Woods Hole* 61 : 118 (1931).

Phialidium heptactis Vanhoffen, *Wiss. Ergebn. 'Valdivia'* 19 : 225 (1911).

Phialidium phosphoricum Vanhoffen, *Dtsch. supol. Exped.* 13 : 19 (1912).

Phialucium mbenga Bigelow, *Bull. U.S. Nat. Mus.* 1 : 293 (1919).

Peduncle absent. Umbrella watch-glass shaped. Mouth with four simple, folded lips. Usually four radial canals present, but up to eight radial canals may be seen in some specimens. Gonads, at the distal half of the radial

canals, hang down vertically from these canals. About 30 tentacles are present; between successive tentacles there are usually three rudimentary bulbs. The rudimentary marginal bulbs are knob-like and the median one between each pair of tentacles, is larger than the other two and is provided with an excretory papilla. The portions of the margin between adjacent tentacles are not equal. Ocelli absent.

More than 60 specimens are in the present collection. It was found in large numbers in some pre-monsoon plankton hauls.

This species has been previously recorded from Bombay as *Phialucium virens*. It is widely distributed from the Straits of Malacca and the Gulf of Thailand, Philippines, Australia, China and Africa. It was originally described from North Carolina and Florida on the east coast of America.

Genus Octophialucium Kramp

Octophialucium indicum Kramp

Plate II (f)

Octophialucium indicum Kramp, *Rec. Ind. Mus.* 53 : 347 (1958); Kramp, *J. Mar. biol. Ass. U.K.* 40 : 184 (1961).

Otocanna polynema Menon, *Bull. Madras Govt. Mus.* 3 : 23 (1932); Nair, *Bull. Cent. Res. Inst., Univ. Travancore* 2 : 63 (1951); George, *J. Zool. Soc. India* 5 : 82 (1953); Ganapati & Nagabhushanam, *Mem. Oceanogr. Andhra Univ.* 2 : 92 (1958).

Umbrella disc-like and of very thick gelatinous consistency; frequently lenticular. Peduncle absent and stomach about one-sixth the diameter of the umbrella. There are eight pointed lips with crenulated margins. Usually eight radial canals present but some specimens have 6 to 11. Radial canals continued inwards, almost up to the centre of the stomach.

Gonads about one-fifth as long as the radial canals, and situated very near the bell margin along the radial canals. There are about 20 to 28 tentacles without marginal or lateral cirri. Tentacles spirally coiled and slightly flattened

with broad, conical basal bulbs with excretory papillae. Between two successive tentacles there are 3-5 (usually four) rudimentary marginal bulbs with an excretory papilla on each tentacle bulb. A closed marginal statocyst between each successive pair of marginal bulbs irrespective of whether they carry a tentacle or not.

The species can be distinguished by the number of tentacles, 3 to 5 rudimentary bulbs between successive tentacles, and marginal vesicles in the same number as tentacles plus rudimentary bulbs.

17 specimens of this species are in the present collection. The largest measures 15 mm in diameter.

This is the first record of this species from Maharashtra. Distribution Indo-west Pacific tropical waters from Madagascar to Tahiti.

Family COMPANULARIIDAE

Genus Phialidium Leuckart

Phialidium malayense Kramp

Plate II (g)

Phialidium malayense Kramp, *J. Mar. biol. Ass. U.K.* 40 : 170 (1961).

Phialidium pacificum Mayer, *Medusae of the world* 1 : 273 (1910).

Bell hemispherical. Stomach large and globular, without a peduncle. Mouth with four prominent, pointed, much folded lips.

Four gonads, borne on the middle one-third of the four narrow, straight radial canals, are oval in shape. The 32 or more tentacles equally spaced on the umbrellar margin. Basal bulbs large but devoid of ocelli or brown pigment; rudimentary bulbs absent. Two statocysts present between each successive pair of tentacles.

This species can be distinguished by its large, globular stomach with four prominent lips, hollow tentacles without brown pigment spot, narrow velum, numerous vesicles, and lack of iridescence of the subumbrella.

15 specimens are in the present collection. An average specimen measures 6 mm in diameter.

This is the first record of this species from Indian waters. It occurs in the waters of North Australia, Amboina, Vietnam and China.

Order LIMNOMEDUSAE

Family OLINDIADIDAE

Genus *Aglauroopsis* Fr. Muller

Aglauroopsis vannuccii Thomas & Chhapgar

Plate III (a)

Aglauroopsis vannuccii Thomas & Chhapgar, *J. Bombay nat. Hist. Soc.* 72 (3) : 809 (1975).

This species was described in 1970 (Thomas & Chhapgar 1975). It can be distinguished by the presence of 28 tentacles with nematocyst rings, small stomach, mouth with four small folded lips, radial canals of average width, smooth sac-like gonads extending nearly three-fourths of the radial canal and with pendant distal ends, and numerous statocysts (one between every two tentacles). Rudimentary tentacles are lacking.

Nine specimens are in the present collection ; the largest measures 8 mm in diameter and 6 mm in height.

This species was first collected from Bombay. Subsequently, it has also been found to occur off Goa.

Order TRACHYMEDUSAE

Family GERYONIIDAE

Genus *Liriope* Lesson

Liriope tetraphylla (Chamisso & Eysenhardt)

Plate III (b)

Geryonia tetraphylla Chamisso & Eysenhardt, *Nova Acta Phys. Medd. Acad. Leopold Carol.* 10 : 357 (1821).

Liriope tetraphylla Gegenbaur, *Z. Wiss. Zool.* 8 : 257 (1856) ; Menon, *Rec. Ind. Mus.* 33 : 503 (1931) ; Menon, *Bull. Madras Govt. Mus.* 3 : 28 (1932) ; Lele & Gae, *J. Univ. Bombay* 3 : 97 (1935) ; Menon, *Proc. Ind. Acad. Sci.* 22 : 41 (1945) ; Nair, *Bull. Cent.*

Res. Inst., Univ. Travancore 2 : 70 (1951) ; Bal & Pradhan, *J. Univ. Bombay* 20 : 76 (1952) ; Kramp, *Rec. Ind. Mus.* 53 : 368 (1958) ; Ganapati & Nagabhushanam, *Mem. Oceanogr. Andhra Univ.* 2 : 93 (1958) ; Kramp, *J. Mar. biol. Ass. U.K.* 40 : 238 (1961).

This species is easily distinguished by its four leaf-shaped gonads situated on the four radial canals. Centripetal canals are present.

This is the only species of the genus and the most abundant and widely distributed oceanic medusa ; it is a valuable indicator of sea currents. 82 mature specimens and 20 young, measuring from 10 to 30 mm, are in the present collection.

It occurs in the warm parts of all the oceans and Mediterranean Sea. In the Pacific, it occurs between 40°S and 40°N, in the Indian Ocean down to 40°S. In the Atlantic it likewise occurs between these degrees of latitude, but in eastern parts it penetrates somewhat further north, into the English Channel.

Family RHOPALONEMATIDAE

Genus *Amphogona* Browne

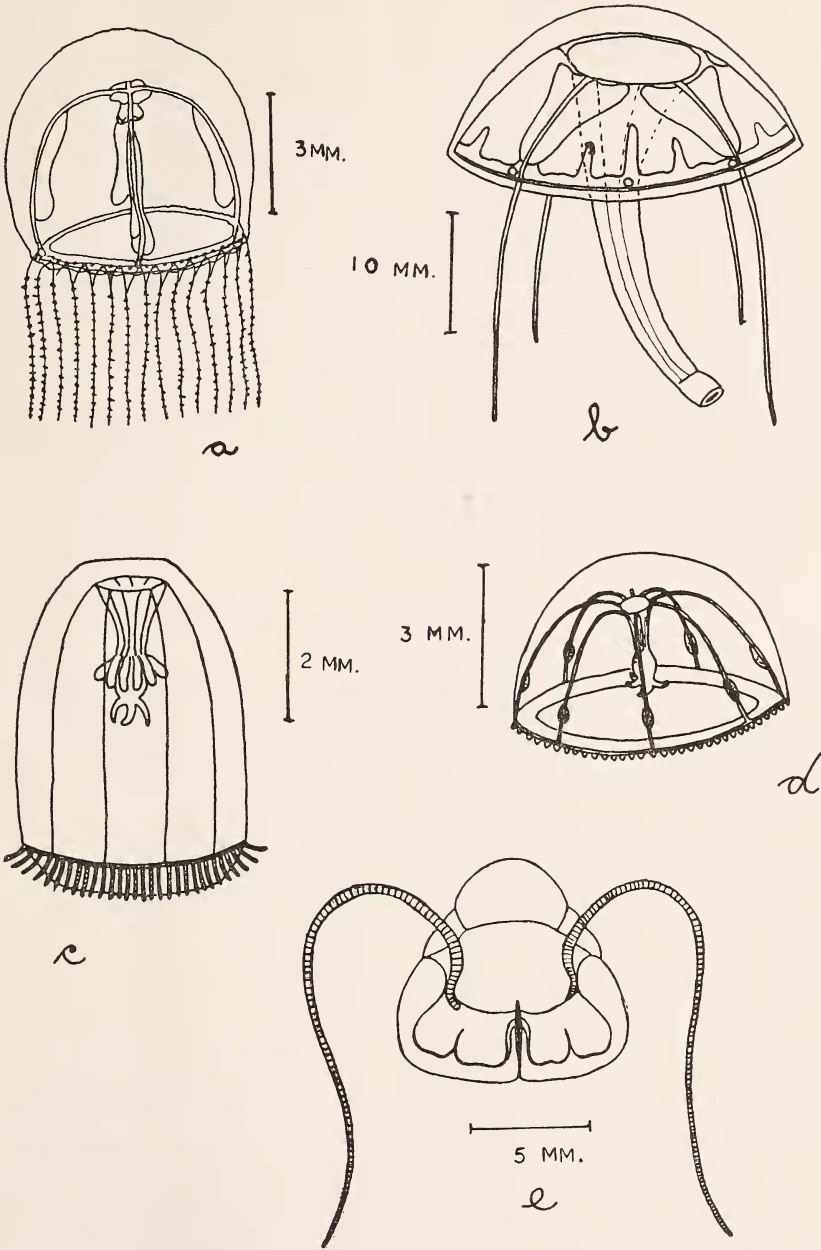
Amphogona apsteini (Vanhoffen)

Plate III (d)

Pantachogon apsteini Vanhoffen, *Wiss. Ergebn. Valdivia* 3 : 65 (1902).

Amphogona apsteini Browne, *Fauna Geog. Maldive Laccad. Archipel.* 11 : 740 (1905) ; Browne, *Rep. mar. Zool. Okhamandal* 2 : 152 (1916) ; Kramp, *J. Mar. biol. Ass. U.K.* 40 : 252 (1961).

Umbrella almost hemispherical, without apical projection, lateral walls thin. Velum very broad. Stomach small, on a small gelatinous peduncle as long as one-third of the height of the umbrella cavity. Four short pointed lips, eight radial canals and eight oval gonads present. Gonads are of unequal size, being alternately very small and somewhat larger. Numerous (almost 60) small tentacles (8 per octant). Statocysts 16 to 24, club-shaped. Lateral or marginal cirri absent.



Medusae of (a) *Aglauropsis vannucci*, (b) *Liriope tetraphylla*, (c) *Aglaura hemistoma*, (d) *Amphogona apsteini*, (e) *Solmundella bitentaculata*.